

From: [REDACTED]
To: [Cleve Hill Solar Park](#)
Subject: Cleve Hill Solar Park Development my ref 20018862 summary of oral presentation 10 09 2019
Date: 20 September 2019 23:13:03
Attachments: [REDACTED]

Dear Madam or Sir,
Please find attached summary of my oral presentation given at the open floor hearing on the 10th September 2019.

With regards,

Bruno Erasin

Cleve Hill Case Team
1/18 Eagle Wing
The Planning Inspectorate
Temple Quay House
Temple Quay
Bristol
BS1 6PN

20th September 2019

Ref: 20018862

Cleve Hill Solar Park Development – Battery Storage Systems Objections – Summary of oral presentation 10/09/2019

Dear Madam or Sir,

I would like to present summary of oral presentation given during open floor hearing on 10th September 2019.

I would like to express my objection to the Cleve Hill Solar Park development based on a number of issues not previously presented. The additional main issues which I would like to bring to the attention of the Planning Inspectorate are summarised as follows:

Decommissioning and waste disposal costs for battery storage systems and redundant solar panels

Based various considerations provided in written submission, it is estimated that the battery storage systems for the proposed CHSP development may be approximately 257,126m³. The current cost for hazardous waste disposal in the UK is about £154 per ton. It is estimated that waste disposal costs for hazardous battery storage units may be in the region of £39,597,404.

The CHSP development submitted planning application suggests that approximately 880,000 solar panels will be installed. Based on conversion factors detailed in IRENA 2016, the weight of the 880,000 solar panels is approximately 17,687tons.

Based on the current costs for hazardous waste disposal in the UK of £154 per ton, waste disposal costs for the solar panels may be in the region of £2,723,915.

Thus, based on limited information provided by CHSP, it is estimated that current waste disposal costs for the battery storage systems and solar panels may be in the region of £42,351,319.

It is my opinion that significant costs will entail in the future during decommissioning of the CHSP development and recommend to the Planning Inspectorate that a minimum financial bond is provided by CHSP in advance of any development, of a minimum of £45million to ensure sufficient funds will be available for decommissioning of the CHSP development. It is also recommended that this financial bond is reviewed annually and increased according to rising costs for hazardous waste disposal.

Human health effects of previous reported exposure model

In my previous objection report I used the ALOHA dispersion modelling tool and considered the case of a 10,000kWh battery storage system catching fire and generating hydrogen fluoride for a duration

of 60 minutes, the predicted ambient hydrogen fluoride concentrations exceed the derived domestic property exposure limit by a factor of 2,444 at a distance of 4.5km and a factor of 1,333 at distance of 7.8km and a factor of 55 at a distance of 10km. A derived exposure limit for domestic properties of 0.018ppm was used.

The potential health effects as published by Public Health England are as follows:

- At ambient concentrations of hydrogen fluoride at 44ppm, predicted up to a distance of 4.5km, that at or above this concentration the general population could experience life-threatening health effects or death;
- At ambient concentrations of hydrogen fluoride at 24ppm, predicted up to a distance of 7.8km, that at or above this concentration there may be irreversible or other serious long-lasting effects or impaired ability to escape;
- At ambient concentrations of hydrogen fluoride at 1ppm, predicted up to a distance of 10km, that at or above this concentration the general population could experience notable discomfort.
- Based on the additional information published by Public Health England, I would like to reiterate that the risk to human health in a catastrophic fire event of a 10,000kwh battery storage system is very significant and foreseeable, and in my opinion not acceptable to potentially expose a large number of residents in close vicinity of the proposed development at CHSP.

Based on the foreseeable and significant human health risks and human health effects from the proposed battery storage systems for the Cleve Hill Solar Park, I would like to reiterate and recommended that any such battery storage system should be at least 15km from any population.

Potential environmental effects of Vanadium redox flow batteries

It was brought to my attention that CHSP development may use vanadium redox flow batteries, instead of Lithium Chloride based batteries.

Based on the technical information detailed by Bryans et al., 2018, I have extrapolated these values to the proposed 350MW (350,000kW) CHSP development using 200kW unit equivalents, estimating that about 1,750 of these units would be required. Vanadium redox batteries use sulphuric acid and vanadium.

It can be calculated that approximately 45,500,000 litres (45,500m³) of electrolyte of a 2 Mole sulphuric acid solution is required for the 350MW system. This equals to approximately 4,941,300 litres (4,941m³) of concentrated sulphuric acid.

Using the same approach, it can be calculated that approximately 8,275,540kg (8,275tons) of vanadium is dissolved in the 45,500,000 litres (45,500m³) of electrolyte solution considering 1 Mole vanadium (i.e 181.88g vanadium per litre) for the 350MW system.

Recommendation- Vanadium Redox Flow Batteries

It is recommended to the Planning Inspectorate to consider that vanadium redox flow batteries are unsuitable for the proposed CHSP development due to foreseeable and significant environmental and the site specific constrains.

Leaching potential of damaged solar panels

Damaged solar panels have the potential to leach heavy metals into soil matrix.

It is recommended to the Planning Inspectorate that CHSP development conduct a thorough investigation and assessment in accordance with UK assessment methodology in relation to mitigation measures for damaged solar panels and undertake an environmental risk assessment of the leaching potential of heavy metals from the solar panels. These investigations should consider site specific environmental constraints such as flood risk, shallow ground water and controlled water in close proximity of the solar panel locations.